BULLETIN

OF THE INSTITUTE OF METALS

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INSTITUTE NEWS

Instructional Meeting for Younger Members

Thirty-three younger members, including three from the Continent, attended the instructional meeting held at Ashorne Hill from 20 to 23 July to consider " The Design and Operation of Plant for Extrusion of Non-Ferrous Metals ". This was the second of such meetings sponsored by the Metallurgical Engineering Committee, who not only suggested the subject for study but also persuaded Mr. E. K. L. Haffner, Dr. N. Swindells, Dr. R. King, and Mr. K. A. Maclean to act as directing staff.

The pattern of the meeting generally followed the one successfully adopted last year,* again with encouraging results. It was originally planned to divide the students into seven syndicates, each of which was to have concentrated on a different aspect of the subject. However, as so many people expressed a desire to study die design and metal flow, the syndicates were re-arranged as follows:

1. Extrusion-press design and tooling, including the factors affecting the choice of an extrusion press.
2. Billet preparation and preheating.
3A. Die design and metal flow.
3B. Die design and metal flow.
4. Run-out and metal handling.
5. Production of tube and hollow sections.

After lunch on Wednesday, 20 July, the syndicates were briefed and provided with notes intended to stimulate their thoughts and discussions. As members attending the meeting had previously been advised to read the papers in *Metallurgical Reviews* by Haffner and Elkan and by Chadwick, a lengthy introduction was not felt to be necessary. The syndicates quickly chose their own leaders and then spent the rest of the afternoon assessing the problems and preparing for the works visits on the following day. In the evening short films provided by three press manufacturers were shown and thoroughly appreciated.

Holford Rod Mill at the works of Imperial Chemical Industries, Ltd., Metals Division, Witton was visited on Thursday morning, where the members had an opportunity to learn about the extrusion of solid shapes in copper and copper alloys. After enjoying I.C.I. hospitality for lunch, the party arrived at Reynolds-T.I. Aluminium Co., Ltd., Redditch, almost on schedule. Here the groups were escorted round one of the extrusion mills primarily devoted to the production of tubes and hollow sections in aluminium alloys.

On the return to Ashorne Hill after tea, the syndicates really got down to the job of assimilating the information gleaned during the day. The struggle to clarify ideas and the preparation of reports continued on Friday morning, when one syndicate created a precedent for an Institute meeting by foregoing the coffee break.

On Friday afternoon and again on Saturday morning, all the members assembled together for the presentation and discussion of the reports. Each report was discussed immediately after presentation, and Mr. Maclean summed up the various discussions as they ended in preference to making a comprehensive summary at the close of the meeting. By devoting six hours to this part of the proceedings, ample time was available for fruitful and constructive discussion, without any of those awkward silences which embarrass chairmen.

Syndicate One merits special mention, as the re-arrangement of the subject resulted in this group having an extremely wide field to cover. They were not daunted by the formidable nature of their task and, in fact, their report showed a capacity for clear thinking and an exceptional appreciation of detail as well as of basic principles. Syndicates Two, Four, and Five presented their findings in rather more general terms, but indicated quite clearly what they wanted to achieve. Neither of the syndicates dealing with die design and metal flow managed to give the impression that they had mastered the problems of die design, and appeared to have given more thought to the vagaries of metal flow.

In conclusion, it is pleasing to be able to record that the younger members maintained a high standard of intelligent activity throughout the meeting and tackled the work with enthusiasm and vigour. This really was a working meeting (the only free time was after dinner on Friday evening), which stimulated and impressed the directing staff.

N. S.

" Metallurgical Reviews ", Vol. 5, No. 18

The latest issue of *Metallurgical Reviews* contains: " Extraction of Metals from Sulphide Ores by Wet Methods ", by F. A. Forward and I. H. Warren; " The Effect of Electroplating on Fatigue Strength," by R. A. F. Hammond and C. Williams; and " X-Ray Microscopy and Microanalysis " by V. E. Cosslett.

Metallurgical Reviews, published quarterly, is available only by annual subscription, the rates being: members 32*s.* 6*d.* ($5.00), post free; non-members 50*s.* ($7.50), post free.

* An account of the first meeting appeared in the *Bulletin* for Sept. 1959.

The Unesco Book Coupon Scheme

The Secretary of the Institute wishes to acquaint members of the Institute, and also non-member subscribers to its publications, with the advantages of the Unesco book coupon scheme. The *Journal* of The Institute of Metals (obtained by membership subscription or otherwise), *Metallurgical Reviews*, *Powder Metallurgy*, and the volumes of the Monograph and Report Series may be paid for by Unesco coupons.

The Unesco Coupon helps institutions and individuals in Unesco Member States to buy publications from other countries. The list of countries which have joined the Unesco Coupon Scheme, with the addresses of national distributing bodies and suppliers, are given below.

Who Distributes Coupons in Your Country?

In all participating countries the government has appointed a national distributing body to sell Unesco Coupons. These agencies can provide information on the Coupon Scheme. Their addresses are given below.

Who can Buy Coupons?

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The value of coupons allotted to each country is limited both by Unesco's hard-currency reserves and by the amount of coupons which the government is able to buy. National distributing bodies may therefore have to make allocations of coupons on a priority basis, whereby the needs of educational, scientific, and cultural institutions serving a large or important group receive first priority.

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Distributing Bodies for Unesco Coupons

Austria: Aussenhandelsstelle für Buch und Graphik, Grünanger gasse 4, Wien 1.

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Ceylon: The University Bookshop, University of Ceylon, Colombo.

France (and French overseas territories and Departments): Direction des Bibliothèques de France, Service de Bons de l'Unesco, 61 rue de Richelieu, Paris 2e.

German Federal Republic: Deutsche Forschungsgemeinschaft, Frankengraben 40, Bad Godesberg bei Bonn.

India: Unesco Science Cooperation Office, 21 Curzon Street, New Delhi 2.

Indonesia: Unesco Science Cooperation Office, P.O. Box 2313, Jakarta.

Israel: National Commission for Unesco, Ministry of Education and Culture, Jerusalem.

Italy: Commissione Nazionale dell'Unesco, 27 Via Calamatta, Rome.

Japan: Japan Society for the Promotion of Science (Nihon Gakujutsu Shinko-kai), Ueno Park, Daito-ku, Tokyo.

Laos: Commission Nationale pour l'Unesco, Ministère de l'Education, Vietiane.

Monaco: Commission Nationale de l'Unesco, Ministère d'Etat, Monaco.

Morocco: Commission Nationale Marocaine, 1 rue Buffon, Rabat.

Tunisia: Ministère de l'Education Nationale, Boulevard Farhat Hached, Tunis.

Turkey: Bibliothèque Nationale (Milli Kütüphane), Ankara.

United Arab Republic: Unesco Science Cooperation Office, 8 Sh. el Salamlik, Garden City, Cairo.

Viet-Nam: Commission Nationale pour l'Unesco, Ministère de l'Education, 89 rue du Président-Thinh, Saigon.

IMPORTANT

Unesco Coupons are valuable, and all necessary precautions should be taken to prevent loss, theft or abuse of coupons. In case of loss or theft, please inform Unesco immediately of the serial numbers of the missing coupons. Unesco can accept no legal responsibility for the replacement of lost coupons, but will try to stop payment.

Unesco is not responsible for the safe delivery of material ordered through the Coupon Scheme. The usual precautions, such as despatch by registered mail, insurance, &c., should therefore be taken.

PERSONAL NOTES

Mr. R. E. Barker has left Melbourne University and taken up an appointment as metallurgist with Austral Bronze Company Pty., Ltd., Sydney, N.S.W.

Mr. C. J. Beevers has been awarded the Ph.D. degree of Sheffield University and has joined the staff of the Central Electricity Generating Board. He is at present working at the Atomic Energy Research Establishment, Harwell.

Mr. K. Bennett has left Frederick Smith and Co., Ltd., and is now Technical Engineer with the Vactite Wire Co., Ltd., Bootle.

Dr. C. J. L. Booker is visiting laboratories in Poland concerned with the electrochemistry of metals, with particular reference to corrosion. He is doing this under a British Council scheme for the interchange of young research workers.

Mr. W. R. Byrne has left the Montana School of Mines and is now a Process Engineer at Texas Instruments Inc., Attleboro, Mass.

Dr. J. H. Cains has resigned his lectureship in the Faculty of Technology, Manchester University, to take up an appointment as Head of the Research Section, Yorkshire Imperial Metals, Ltd., Leeds.

Mr. B. W. Cordon has left Raleigh Industries, Ltd., and has been appointed Works Metallurgist at British Ropes, Ltd., Retford.

Mr. B. G. Davies has joined the staff of Henry Wiggin and Co., Ltd., Hereford.

Mr. Edwin Davis has resigned his position with Imperial Chemical Industries, Ltd., Metals Division, to take up the appointment of Technical Manager (Metallurgical) at the U.K. Atomic Energy Authority, Springfield Works, Preston.

Mr. D. Dew-Hughes is now at the Department of Metallurgy, Cambridge.

Dr. E. Freeth has joined the staff of G. A. Harvey and Co. (London), Ltd.

Mr. V. R. Friebel has left the Missouri School of Mines and Metallurgy, where he was awarded the M.Sc. degree, and is now a research metallurgist at the Central Research Laboratories of the American Smelting and Refining Company.

Mr. G. R. Gohn, Supervisor, Mechanical Testing Laboratories, Bell Telephone Laboratories, New York, has received the Award of Merit of the American Society for Testing Materials.

Dr. R. I. Jaffee has been appointed a technical manager in the Department of Metallurgy, Battelle Memorial Institute, Columbus, Ohio.

Dr. W. L. Kent has been appointed General Manager of the Warrington factories of The British Aluminium Co., Ltd.

Dr. R. Kiessling has been appointed Director of the Metallografiska Institutet, Stockholm (The Swedish Institute for Metal Research). He was previously Chief Metallurgist at AB Atomenergi, Stockholm.

Mr. K. S. Krishnan has left Purdue University and is now engaged on graduate studies in the Metallurgical Research Laboratory, University of Florida.

Mr. W. H. Mather has been appointed Managing Director of The Head Wrightson Machine Co., Ltd., Middlesbrough.

Mr. D. P. C. Neave has been appointed Vice-Chairman of the Wolverhampton Metal Co., Ltd.

Mr. B. L. Page has left John Dale, Ltd., and joined Luxfer Ltd., London, N.W.10.

Mr. E. C. W. Perryman has left Atomic Energy of Canada, Ltd., to become Deputy Head of the Culcheth Laboratories of the U.K. Atomic Energy Authority.

Mr. T. R. Savage has left E. Jopling and Sons, Ltd., Sunderland, and is now with the Wolsingham Steel Co., Ltd., Bishop Auckland.

Dr. G. Schileo has returned to FIAT, Sezione Energia Nucleare, Turin, after a year in the United States.

Mr. B. E. Sundquist has left the Illinois Institute of Technology and is now at the Bain Laboratory for Fundamental Research, U.S. Steel Corp., Monroeville, Pa.

Mr. J. S. Vanick, Consultant Metallurgist, Sea Girt, N.J., has received the Award of Merit of the American Society for Testing Materials.

Mr. R. Varley is now at the Research Laboratories of Rolls-Royce, Ltd., Derby.

Dr. R. F. Weil has left the English Electric Co., Ltd., and is now at the Passfield Research Laboratories of Metal Containers, Ltd., Liphook, Hants.

Mr. J. Westlake has left Liverpool University and is now an Assistant Technical Officer at Imperial Chemical Industries, Ltd., Metals Division, Birmingham.

Dr. N. T. Williams has left University College, Swansea, and joined the staff of the Central Electricity Research Laboratories, Leatherhead.

Dr. P. B. A. Willis is now with Imperial Aluminium Co., Ltd., Waunarlwydd, Swansea.

Mr. P. A. Woodrow has left Manchester University and is now a metallurgist with Johnson, Matthey and Co., Ltd.

Dr. Ing. E. Zurek has been appointed Chairman of John Yuille (Metalwork), Ltd., Glasgow.

OBITUARY

Professor N. P. Gandhi

Professor N. P. Gandhi, a distinguished metallurgist and a pioneer in metallurgical education in India, died at Devlali on 26 June 1960, aged 73.

Nagardas Purushottam Gandhi had a brilliant academic career and took a first-class honours degree in metallurgy at the Royal School of Mines, London, in 1914. After brief periods of employment with various firms, including Tata Sons, Bombay, for whom he acted as Chief Engineer and General Manager of their wolfram mines in Tavoy (Lower Burma), he joined the newly opened Benares Hindu University in 1919.

There he was responsible for starting the first degree course in India in mining, metallurgy, and geology. He served the University for 23 years as Principal of the College of Mining and Metallurgy and made a great name for himself not only as an inspiring teacher but also as a man of discipline with exemplary qualities of thoroughness, exactness, and tremendous enthusiasm. He took a keen interest in the careers of many of his ex-students and kept in regular touch with them. He was a strong believer in the value of sports and games.

After his retirement in 1942, Professor Gandhi worked for a time as a consulting geologist and mining engineer to various organizations and finally started, in 1948, an industrial research laboratory of his own at Devlali. Unfortunately, failing health during the last few years prevented him from developing this venture fully.

He was an honorary member of the Indian Institute of Metals and of the Bombay Metallurgical Society, which he founded and of which he served as President for three years. He was a Fellow of the Institution of Metallurgists, a Member of the Institution of Mining and Metallurgy, of the Iron and Steel Institute, of the Institute of Metals, and of the American Society for Metals, and he was a Life Member of the Mining,

Geological, and Metallurgical Institute of India. He was President of the Geological Section of the Indian Science Congress in 1935 and of the Geological, Mining, and Metallurgical Society of India. He was an active member of the All-India Manufacturers' Organization and a Past-President of the Non-Ferrous Metals Section of the Indian Standard Institution.

Professor Gandhi acted as Honorary Corresponding Member to the Council for India from 1941 to 1955.

LOCAL SECTION LECTURE

Some Properties of the Alkali Metals at Very Low Temperatures

At a meeting of the Oxford Local Section on 5 April 1960, Dr. H. M. ROSENBERG, of The Clarendon Laboratory, Oxford, gave a lecture on "Some Properties of the Alkali Metals at Very Low Temperatures."

He said that experiments on the alkali metals were always of interest and importance because, although they were generally not useful in technology, their relatively simple electronic structure enabled the theoretical physicist to predict their properties with more confidence than could be done for any other metals. Sodium, in particular, had achieved pride of place as the metal which came nearest to the "ideal", simple, free-electron metal, and it was usually considered as that metal which gave the best agreement with elementary theory.

At low temperatures, however, it had been found that both lithium and sodium underwent a martensitic transformation from their normal b.c.c. structure to a faulted h.c.p. arrangement. This had first been detected from X-ray diffraction experiments by Barrett.[1] These experiments, and later ones,[2] suggested that the transformation occurred at about 76° K for lithium and at about 31° K for sodium.

This transformation showed up very clearly in other types of low-temperature experiment. In sodium, for example, reversion to the original b.c.c. structure did not occur until about 45° K and hence if the specimen was cooled below 31° K, so that some of it transformed, and it was then warmed up to, say, 40° K, the transformed material remained. Its properties could then be compared with metal which had been cooled directly from room temperature to 40° K and which was therefore still entirely b.c.c. Dugdale and Gugan [3] had compared the electrical resistivities of the pure b.c.c. and the mixed phase in this manner at 40° K and they had been able to trace out the transformation curve of sodium from these measurements.

Important information about the transformation could also be obtained from specific-heat experiments. Martin [4] had measured the extra specific heat that was associated with the transformation, and from this he had shown that in sodium about 50% of the metal must be transformed to the h.c.p. phase on cooling below 31° K.

The transformation also affected the mechanical properties of lithium and sodium.[5] In the martensite region continuous hardening was observed throughout a tensile test. This was presumably due to the boundaries between transformed and untransformed regions acting as barriers to dislocations.

Miscroscopy at liquid-helium temperatures [2,6] had revealed the transformation in a very striking manner. For a specimen whose surface had been prepared at room temperature, about 45% of the sodium and 100% of the lithium appeared to have been transformed. This was in good agreement with the specific-heat predictions. A smaller amount of transformation was observed in sodium when the surface had been prepared at lower temperatures, because a specimen with a small grain size was produced and this inhibited the spread of the transformation.

These experiments showed that the interpretation of low-temperature experiments on sodium and lithium required some care, and in particular sodium could not be considered to be as ideal or as simple as had been hoped. Experiments on potassium showed that it did not transform, at least down to 1° K, and hence this metal should be used for investigations which might be upset by the existence of a second phase.

REFERENCES

1. C. S. Barrett, *Phys. Rev.*, 1947, **72**, 245; *J. Inst. Metals*, 1955–56, **84**, 43; *Acta Cryst.*, 1956, **9**, 671.
2. D. Hull and H. M. Rosenberg, *Cryogenics*, (Sept. 1960).
3. J. S. Dugdale and D. Gugan, *Proc. Roy. Soc.*, 1960, [A] **254**, 184.
4. D. L. Martin, *ibid.*, 1960, [A], **254**, 433.
5. D. Hull and H. M. Rosenberg, *Phil. Mag.*, 1959, **4**, 303.
6. D. Hull and H. M. Rosenberg, *Phys. Rev. Letters*, 1959, **2**, 205.

OTHER NEWS

Joint British Committee for Stress Analysis

Following an exploratory meeting in March 1960, arranged by the Institute of Physics, a Joint British Committee for Stress Analysis has been set up in Great Britain.

This Committee will represent the interests of Great Britain in the field of stress analysis at the periodic meetings of the Permanent Committee, which are held in Europe, and will thus ensure adequate British participation in international conferences in the field of stress analysis.

The principal object of the Permanent Committee, membership of which is open to all West European countries, is the furtherance of international collaboration in the field of stress analysis, and in seeking to achieve this end international conferences will be arranged at four-year intervals. Such conferences will normally be phased with the International Congresses on Applied Mechanics. The Officials and Secretariat of the Permanent Committee will normally be appointed by the National Committee in whose country the next international conference is due to be held.

Mr. A. F. C. Brown of the National Physical Laboratory, and the representative of the Institution of Mechanical Engineers, has been elected the first Chairman of the Committee, and The Institution of Mechanical Engineers provides the Secretariat for the Committee.

Journal of the Metallurgical Club, Glasgow

The 1959–60 issue of the Journal of the Metallurgical Club, Royal College of Science and Technology, Glasgow, has recently appeared. In addition to news of the Club's activities, it contains five scientific papers, among them "Energy Considerations in Aluminium Production", "Metallographic Studies on Oxidation of Niobium", and "The Powder Metallurgy of Titanium".

Copies may be obtained, price 5*s*. each, from the Metallurgical Club, Royal College of Science and Technology, Glasgow, C.1.

DIARY

18 October. Liverpool Metallurgical Society. Visit to Messrs. Grayson, Rollo, and Clover Docks, Ltd.

18 October. North East Metallurgical Society. "Techniques in Investigation of Metallurgical Failures in Aircraft Components", by D. A. Ryder. (Cleveland Scientific and Technical Institution, Corporation Road, Middlesbrough, at 7.30 p.m.)

20 October. Sheffield Local Section. Symposium on Solidification: (i) A. Cibula; (ii) I. C. H. Hughes; (iii) L. J. Watkins. (Applied Science Building of the University, St. George's Square, Sheffield 1, at 7.30 p.m.)

26 October. Manchester Metallurgical Society. "Metallurgical Aspects in the Development of Fast Fission Reactors", by Professor C. R. Tottle. (Manchester Literary and Philosophical Society, George Street, Manchester, at 6.30 p.m.)

27 October. Birmingham Local Section. Presidential Address to the Birmingham Metallurgical Society, by L. G. Beresford. (College of Technology, Gosta Green, Birmingham 4, at 6.30 p.m.)

27 October. Southampton Metallurgical Society. "Direct Observations of Dislocations", by Dr. R. B. Nicholson. (Engineering Block, Southampton University, at 7.15 p.m.)

1 November. Oxford Local Section. "Protective Metal Coatings from the Vapour Phase", by L. W. Owen. (Cadena Café, Cornmarket Street, Oxford, at 7.15 p.m.)

3 November. London Local Section. "Long-Term Creep Tests: A Discussion of Recently Expressed Views", by Dr. N. P. Allen. (Royal School of Mines, Prince Consort Road, London, S.W.7, at 7.0 p.m.)

3 November. North East Metallurgical Society. "Modern Developments in Steelmaking", by Dr. J. Pearson. (Cleveland Scientific and Technical Institution, Corporation Road, Middlesbrough, at 7.30 p.m.)

8 November. South Wales Local Section. "Metals in High-Speed Flight", by Professor A. J. Kennedy. (Metallurgy Department, University College, Singleton Park, Swansea, at 6.30 p.m.)

9 November. Manchester Metallurgical Society. "Casting", by Dr. D. V. Atterton. (Manchester Literary and Philosophical Society, George Street, Manchester, at 6.30 p.m.)

10 November. Birmingham Local Section. To be arranged.

10 November. East Midlands Metallurgical Society. "Die-Casting", by Dr. A. Street. (Derby and District College of Art, Derby, at 7.30 p.m.)

10 November. Liverpool Metallurgical Society. "Metallurgical Problems Associated with Mild-Steel Strip", by E. D. Harry. (Department of Metallurgy, University of Liverpool, at 7.0 p.m.)

14 November. Scottish Local Section. "The Cold Extrusion of Steel", by H. L. D. Pugh. (Institution of Engineers and Shipbuilders, Elmbank Crescent, Glasgow, C.2, at 6.30 p.m.)

17 November. Sheffield Local Section. "Metal and the Architect", by A. Daykin. (Applied Science Building of the University, St. George's Square, Sheffield 1, at 7.30 p.m.)

17 November. Southampton Metallurgical Society. "Metallurgy of Beryllium", by Dr. Craik. (Engineering Block, Southampton University, at 7.15 p.m.)

17 November. West of England Metallurgical Society. "Slag Functions in Non-Ferrous Metallurgy", by Professor R. Higgins. (College of Technology, Ashley Down, Bristol 7, at 7.30 p.m.)

23 November. Manchester Metallurgical Society. "New Aspects of the Electron Theory of Metals", by Professor G. V. Raynor. (Manchester Literary and Philosophical Society, George Street, Manchester, at 6.30 p.m.)

24 November. Birmingham Local Section. "General Metallurgical Problems in the Motor Industry", by R. J. Brown. (College of Technology, Gosta Green, Birmingham 4, at 6.30 p.m.)

29 November. Oxford Local Section. Junior Members' Meeting. "Electron Bombardment": (*a*) "Metallurgical Applications of Electron Probe Micro-Analysis", by Dr. V. D. Scott; (*b*) "Electron Beam Melting", by D. B. Gasson; (*c*) "The Theory of Electron Probe Micro-Analysis", by N. Swindells. (Cadena Café, Cornmarket Street, Oxford, at 7.15 p.m.)

APPOINTMENTS VACANT

OSRAM LAMP DIVISION

requires

METALLURGISTS

The Osram Lamp Division of the General Electric Company wishes to appoint Metallurgists for their new and expanding Metals Development Laboratory.

A GRADUATE METALLURGIST

with initiative is required to work in close collaboration with the Research Laboratories and the factory production teams on problems covering a wide field of subjects connected with refractory metals.

AN ASSISTANT TECHNICIAN

is also required, preferably aged 20–25 years studying for the L.I.M. A young man with a technical qualification who is interested in specializing in Metallurgy would be considered.

Apply with details of age, qualification and experience (if any), to

SENIOR PERSONNEL OFFICER,
THE G.E.C., LTD.,
OSRAM LAMP DIVISION,
EAST LANE, N. WEMBLEY, MIDDLESEX.

Firth Brown Tools Limited
Sheffield

A vacancy exists in the Research Laboratories of the above company for a

METALLURGIST

Applications are invited from recently graduated or experienced Metallurgists under 30 years of age for this position, which offers a wide field of experience in applied Metallurgical Research with particular reference to the development of modern tool-making materials.

Salary will be commensurate with age, qualifications, and experience.

Written applications should be addressed to the Labour Manager, Firth Brown Tools, Ltd., Speedicut Works, Carlisle Street East, Sheffield 4.

PHYSICAL CHEMISTS

are required by the United Kingdom Atomic Energy Authority at Dounreay Experimental Reactor Establishment, Thurso, Caithness, Scotland, to join teams engaged on a programme of work on the development of fuel elements and their materials for use in Fast Reactors. The work covers the fabrication of plutonium and uranium alloys, ceramics and cermet materials; the assessment of the physical, mechanical, and metallurgical properties of these materials; the testing of fuel elements prior to irradiation; and the preparation and irradiation of specimens in reactors.

The research required embraces every aspect of fundamental and applied metallurgy and offers excellent career prospects to those who are interested in the field of metallurgy of reactor fuels.

Applicants should have at least a second-class honours degree in metallurgy, physics, or physical chemistry, or equivalent qualification.

Starting salary will be assessed according to age, qualifications, and experience on the scales £1365 to £1657 or £755 to £1250. For appointment on the former scale applicants must have at least 3 years' post-graduate research experience and be at least 26 years of age.

Contributory superannuation.

Hostel accommodation available. Staff housing scheme.

Send postcard for application form, quoting reference 366/J102, to Personnel Manager at above address.

Plessey

Following the retirement of the Company's

CHIEF WORKS
METALLURGIST/CHEMIST

applications are invited for this appointment which involves professional consultancy to senior management and technical staff of the Company's factories, control of the Central Chemical and Metallurgical Laboratories at Ilford, and liaison with customers at senior level.

The materials covered include ferrous and non-ferrous metals, magnetic materials, ceramics, rubbers, and resins as used in electronic component manufacture. Experience in the supervision of chemical, metallurgical, and physical tests on such materials is essential.

Candidates should possess an Honours Degree in Chemistry or Metallurgy, though a high qualification of the appropriate professional body would be acceptable.

Applications, which will be treated in the strictest confidence, should state age, experience, and qualifications and be sent to A. M. Brown, Executive Director (Personnel).

THE PLESSEY COMPANY LIMITED
VICARAGE LANE, ILFORD, ESSEX

THE RESEARCH LABORATORIES of The British Aluminium Co., Ltd., require a Metallographer for their Physical Metallurgy Group. Minimum qualification O.N.C., but H.N.C. or L.I.M. desirable. Apply to Director of Research, Chalfont Park, Gerrards Cross, Bucks.

UNIVERSITY OF MELBOURNE

SENIOR LECTURESHIP OR LECTURESHIP IN ENGINEERING MATERIALS

Applications are invited for the above-mentioned position.

Applicants should possess an honours or higher degree in science or engineering and should have had teaching and research experience in the fields of the physics of solids, the mechanics of solids, or solid-state chemistry. Duties will include lectures and supervision of laboratory classes for second- and fourth-year engineering students who are required to study engineering materials on the basis of solid-state physics and chemistry.

Salary range: Senior Lecturer £A2480–2950 per annum; Lecturer £A1660–2360 per annum.

Further information may be obtained from the Secretary, Association of Universities of the British Commonwealth, 36 Gordon Square, London, W.C.1.

Applications close, in Australia and London, on *14th November 1960.*